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| 10/553,308 | 10/14/2005 | Philip Edward Haskell | 05-861 | 1898 |
| 20/306 7590 04/30/2008 MCDONNELL BOEHNEN HULBERT & BERGHOFF LLP 300 S. WACKER DRIVE 32ND FLOOR CHICAGO, IL 60606 | | | | |
| EXAMINER | | | | |
| LIU, HARRY K | | | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/553,308

Applicant(s)

HASKELL, PHILIP EDWARD

Examiner

HARRY LIU

Art Unit

3662

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2008.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9, 11-23 and 26-33 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-9, 11-23 and 26-33 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Receipt is acknowledged of applicant's amendment filed (1/30/2008). Claims (1-9, 11-23, 26-33) are pending and an action on the merits is as follows.

Applicant's arguments with respect to claims (1-9, 11-23, 26-33) have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 12 & 27 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. It is contradicting to claim the **second** splitter incorporates **first and second** splitter while claiming they are **remotely located** (see claim 12 & 27 lines 1-2).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 5, 11, 13, 16, 20, 26 & 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shapira (2006/0068848) in view of Thomas (2004/0209572).

Regarding claims 1,16, Shapira discloses a phased array pair (Abstract) with adjustable electrical tilt (paragraph 0017) and having an array of antenna elements (Abstract) incorporating **a**) variable phase shifter (paragraph 0058) for introducing relative phase shift between first and second RF signals (see FIG. 3 below), **b**) splitting apparatus (splitter article 38) for dividing the relatively phase shifted first and second RF signals into component signals and **c**) a signal combining network for forming vectorial (a phase difference is a vector difference) combinations of the component signals to provide respective signal for each antenna element with corresponding angle of electrical tilt to phase shift (paragraph 0017).

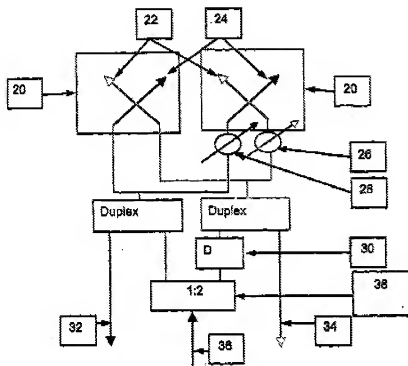


Fig. 3

Shapira does not disclose a vectorial combiner for combining first or second signals for providing drive signals for each individual antenna element. However, Thomas teaches the use of second splitter and a combining network (article 124 in FIG. 6 below) for producing component signal as drive signal for each individual element for controlling antenna tilt (paragraph 0004-0005). It would have been obvious to modify Shapira with Thomas by incorporating the claimed feature in order to extract out the drive signal with various combination of phase and amplitude and use it for controlling antenna electric tilt.

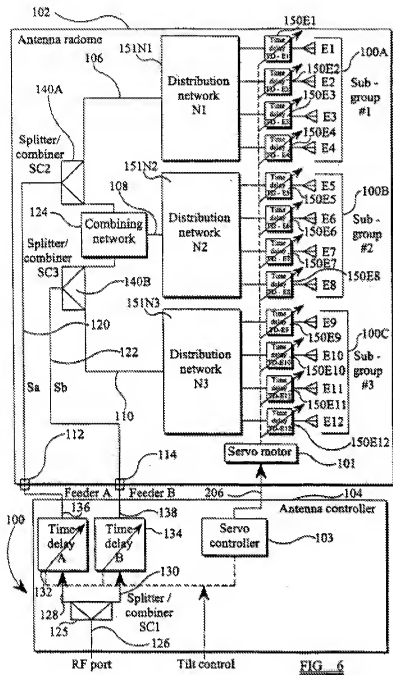


FIG. 6

Regarding claims 5, 11, 20, 26, Shapira discloses a splitting apparatus (article 38) divides component signal for input to the signal phase shifting (article 26, 28) and combining network (article 20) (see FIG. 3 above). Note that all devices are co-located

on the same platform since they are antenna on the same sector of a same base station (claims 10, 26).

Regarding claims 13, 28, Shapira discloses variable phase shifter (article 26 & 28 in FIG. 11) but fails to specifically disclose use of first variable phase shifter connected in a transmit mode, second variable phase shifter connected in receive mode. However, Thomas teaches two variable phase shifter with first splitter (see FIG. 6 above). Though Thomas does not specifically disclose one is for transmit and the other one is for receive, it is a common implementation in cellular cell by using one feed cable for TX antenna and another receive cable for RX antenna. It would have been obvious to modify Shapira with Thomas by incorporating claimed feature in order to achieve separation of TX and RX lines.

5. Claims 14-15, 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shapira (2006/0068848) in view of Thomas (2004/0209572), as applied to claims 1, 16 rejection above, and further in view of Thomas (2004/0252055).

Regarding claims 14-15, 29-30, Shapira discloses use of two variable phase shifters and combiner but fails to disclose a plurality of variable phase shifters associated with respective operators and filtering (claim 14), respective pair of variable phase shifters for each operator (claims 15, 29), components have both forward and reverse signal processing (claim 30). However, Thomas (2004/0252055) teaches the use of filtering (paragraph 0009) and variable phase shifter associated with respective operator (two for each operator) (paragraph 0170) (FIG. 14) and Tilt control unit 704 (article 704 in FIG. 12). It would have been obvious to further modify Shapira with

Thomas (2004/0252055) by incorporating filtering and corresponding variable phase shifter, tilt control processing for respective operator in order to extract the wanted signal frequency and be capable of individually control each operator's tilt requirement in transmit or receive mode.

6. Claims 2, 6-7, 17, 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shapira (2006/0068848) in view of Thomas (2004/0209572), as applied to claims 1, 16 rejection above, and further in view of Gordon (5410321).

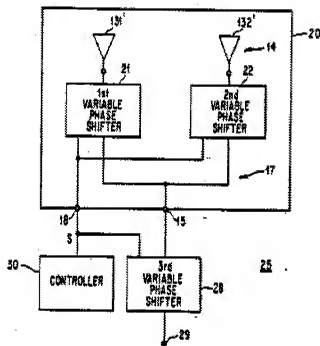
Regarding claims 2, 6-7, 17, 21-22, Shapira, as modified with Thomas, discloses a phased array antenna but fails to specifically disclose use of odd number of antenna elements (for claims 2, 17) or 180 degrees (for claims 7, 22) hybrid couplers (for claims 6, 21). However, Gordon teaches the use of odd number antenna elements and 180 degrees hybrid coupler for combining signal. It would have been obvious to further modify Shapira with Gordon by incorporating 180 degrees hybrid coupler and odd number elements in order to reduce interference between antenna elements.

7. Claims 3-4, 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shapira (2006/0068848) in view of Thomas (2004/0209572), as applied to claim 1 above, and further in view of Kuramoto (5281974).

Regarding claims 3-4, 18-19, Shapira, as modified with Thomas, discloses a phased array antenna but fails to specifically disclose use of serial connection of first and second variable phase shifters (claim 3, 18) or a plurality of phase shifters such that some of the signals passed through all second variable phase shifters and some have not (claims 4, 19).

However, Kuramoto discloses use of first and second variable phase shifters and a plurality of variable phase shifters (see FIG 2 below). It would have been obvious to further modify Shapira with Kuramoto in order to do impedance matching or reducing intermodulation noise.

FIG. 2



8. Claims 8-9, 23,31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shapira (2006/0068848)) in view of Thomas (2004/0209572), further in view of Gordon (5410321), as applied to claims 1, 6, 16, 21 above, and furthermore in view of Boire (4749969).

Regarding claims 8-9, 23, 33, Shapira as further modified by Gordon discloses all claim limitations except for specifying ring hybrid with circumference $(n+1/2)\lambda$,

neighboring ports separated by $\lambda/4$ (claims 8, 23,33) , input terminal with resistor for impedance matching (claims 9, 33). However, Boire teaches a 180 degree hybrid ring phase shifting apparatus with $1.5 (1 + \frac{1}{2})$ wavelength circumference and $\frac{1}{4}$ wavelength spacing ("rat race" column 1, lines 14-37) and resistor for impedance matching (column 3, lines 28-38). It would have been obvious to further modify Shapira with Boire by incorporating as claimed circumference, spacing and resistor in order to satisfy hybrid design specifications and requirement of element spacing in an antenna array.

Regarding claims 31-32, Shapira as further modified by Boire discloses all claim limitations except for specifying hybrid are designed to convert input signal I1 and I2 into vector sum or difference. However, a ring hybrid with 180 degree hybrid implies signals are fed into the hybrid and converted either with 180 degree difference (difference) or no difference (sum).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Liu whose telephone number is 571-270-1338. The examiner can normally be reached on Monday -Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, please **leave a voice message** with application serial number and nature of call, a response within 24 hours can be expected during regular business days. Also, the examiner's supervisor, Thomas Tarcza can be reached on 571-272-6979. The fax phone number for the organization where this application or proceeding is assigned is 571-270-2338.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry Liu/

Examiner, Art Unit 3662

April 30, 2008

/Thomas H. Tarcza/

Supervisory Patent Examiner, Art Unit 3662